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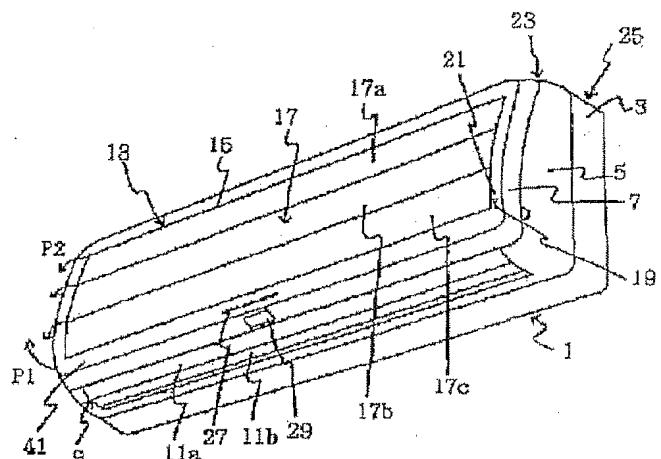
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TITLE : AIR CONDITIONER



ABSTRACT : PROBLEM TO BE SOLVED: To improve the cleaning property of a suction louver while improving design properties, by a method wherein the rear part of a casing is covered by a back cover and the back cover is equipped with a louver driving mechanism unit for operating the suction louver.

SOLUTION: The rear part of a casing for an indoor unit 1 is covered by a back cover or a resin-molded back cabinet, and a resin-molded decorative cover 5 is provided on the front surface of the back cabinet 3 while a resin-molded front panel 7 is provided on the front surface of the decorative cover 5. A plurality of suction louvers 17 are attached to the front panel 7 so as to close the opening unit 15 of the front surface of the same, while the suction louvers 17 are equipped with a pair of projected rotary shafts 19 and respective rotary shafts 19 are supported rotatably by bearings 21 provided on both sides of the opening unit 15 of the front panel 7, to turn respective suction louvers 17 through the louver driving mechanism unit equipped in respective suction louvers 17.

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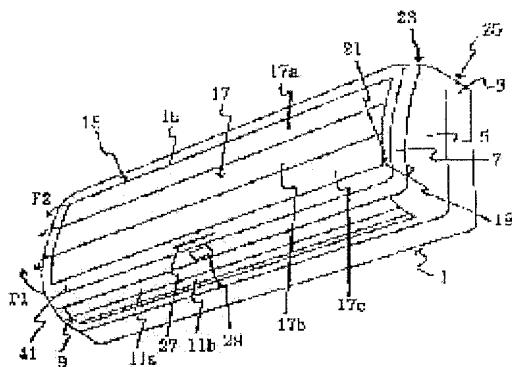
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(54) AIR CONDITIONER

(57)Abstract:

PROBLEM TO BE SOLVED: To improve the cleaning property of a suction louver while improving design properties, by a method wherein the rear part of a casing is covered by a back cover and the back cover is equipped with a louver driving mechanism unit for operating the suction louver.

SOLUTION: The rear part of a casing for an indoor unit 1 is covered by a back cover or a resin-molded back cabinet, and a resin-molded decorative cover 5 is provided on the front surface of the back cabinet 3 while a resin-molded front panel 7 is provided on the front surface of the decorative cover 5. A plurality of suction louvers 17 are attached to the front panel 7 so as to close the opening unit 15 of the front surface of the same, while the suction louvers 17 are equipped with a pair of projected rotary shafts 19 and respective rotary shafts 19 are supported rotatably by bearings 21 provided on both sides of the opening unit 15 of the front panel 7, to turn respective suction louvers 17 through the louver driving mechanism unit equipped in respective suction louvers 17.



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CLAIMS

[Claim(s)]

[Claim 1]An air conditioner comprising:

Constitute a case which equipped an inside with a filter, a heat exchanger, and an air blasting fan from a back cover and the front panel, and said front panel, A mechanism in which maintenance make the upper part into a fulcrum, provide the lower part in said back cover possible [opening] and removable via a hinge region, and according [said hinge region] said front panel to stress to said back cover and its release are possible while providing a suction part in the anterior part. A removable filter with which said back cover is arranged at anterior part of said heat exchanger.

[Claim 2]The air conditioner comprising according to claim 1:

Supporting ribs in which said hinge region is provided in the both-sides upper part.

The axis of rotation provided in these supporting ribs.

A bearing part which supports this axis of rotation with stress.

A release lever provided in this bearing part.

[Claim 3]An air conditioner comprising:

Constitute a case which equipped an inside with a filter, a heat exchanger, and an air blasting fan from a back cover and the front panel, and said front panel, While providing a suction part in the anterior part, via a hinge region, the upper part is made into a fulcrum, the lower part is provided in said back cover possible [opening] and removable, said hinge region equips said back cover with a mechanism in which maintenance and its release are possible for said front panel, and said suction part is an opening.

Two or more suction louvers attached pivotable so that said opening may be concealed in the 1st state and said opening may be opened in the 2nd state.

A removable filter which is provided with an interlocking part which interlocks said two or more suction louvers and with which said back cover is arranged at anterior part of said heat exchanger.

While operating said suction louver, they are said front panel and a disengageable louver drive mechanism part.

[Claim 4]The air conditioner according to any one of claims 1 to 3, wherein said front panel provides a height which engages with a crevice of a back cover in the lower inside.

[Claim 5]An air conditioner comprising:

Constitute a case which equipped an inside with a filter, a heat exchanger, and an air blasting fan from a back cover and the front panel, and said front panel, While providing a suction part in the anterior part, via a hinge region to said back cover, The upper part is made into a fulcrum, the lower part is provided so that opening is possible, an opening angle locking mechanism in which said front panel maintains an opened condition with a predetermined angle is established, said hinge region equips said back cover with a mechanism in which maintenance according said front panel to stress and its release are possible, and said suction part is an opening.

Two or more suction louvers attached pivotable so that said opening may be concealed in the 1st state and said opening may be opened in the 2nd state.

A removable filter which is provided with an interlocking part which interlocks said two or more suction louvers and with which said back cover is arranged at anterior part of said heat exchanger.

While operating said suction louver, they are said front panel and a disengageable louver drive mechanism part.

[Claim 6]Back cabinets in which said heat exchanger and said air blasting fan are attached to said back cover, The air conditioner according to any one of claims 1 to 5 being arranged at anterior part of these back cabinets, and constituting from said louver drive mechanism part and a dressing cover in which said filter is attached.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] The suction louver in which two or more opening and closing are possible is provided in the front face of the case which equipped the inside with the filter, the heat exchanger, and the air blasting fan. According to a shutdown state, said suction louver is shut and design nature is improved, and by operational status, the air conditioner which opened said suction louver and improved operating efficiency is started, and it is related with the air conditioner which made cleaning nature and filter replacement easy especially.

[0002]

[Description of the Prior Art] The blow-off angle of the wind back board which provided two or more pivotable suction louvers in the suction part provided in the front face of the case attached to a wall surface in the conventional air conditioner, and was provided in the blow-off part, and the sink angle of the above-mentioned suction louver by making it interlock. While closing a suction louver at the time of shutdown and preventing invasion of dust etc., design nature is improved by making a suction part plate-like, and there is a thing it was made to raise performance at the time of operation. In these air conditioners, what detaches and attaches a filter from a blow-off part is common.

[0003] Said conventional example is indicated to publications before examination, such as JP,1-95249,A and JP,64-41729,A, for example.

[0004]

[Problem(s) to be Solved by the Invention] However, in said conventional example, since the suction louver is directly attached to the front face of a case, when removing the dust adhering to a suction louver, since it is forced work [at a height, such as wiping with a dustcloth the front face of the case attached to a wall surface,], there being not only a problem in cleaning workability but safety has a technical problem.

[0005] In the conventional example, in order to have to detach and attach a filter to be cleaned from the crevice between narrow blow-off parts frequently, attachment and detachment of the filter carried out and it ran away. In the air conditioner which adopted the heat exchanger straight on a multi stage story so that sectional shape may wrap a flowing-through fan which is the mainstream in recent years especially. Also structurally also in user-friendliness, having to wrap a heat exchanger for a filter in a wrap sake, having to incurvate said heat exchanger greatly like, and making this curved filter detach and attach from the slit of a blow-off part has a technical problem also from fields, such as scattering of the dust from the filter at the time of attachment and detachment.

[0006] There is the 1st purpose of this invention in providing the air conditioner which improved the cleaning nature of the suction louver, improving design nature.

[0007] There is the 2nd purpose of this invention in providing the air conditioner which makes attachment and detachment of a filter easy, improving design nature.

[0008]

[Means for Solving the Problem] In order to attain said 1st purpose, in an air conditioner concerning the 1st invention. While constituting from a filter, a heat exchanger, a back cover that covers the case rear for a case provided with an air blasting fan, and the front panel which covers case anterior part inside and providing a suction part in anterior part of said front panel, Two or more suction louvers which establish this front panel in said back cover removable, conceal said suction part in the 1st state to said suction part, and open said suction part in the 2nd state and which are attached pivotable, It has an interlocking part which interlocks said two or more suction louvers, and has a louver drive mechanism part which operates said suction louver to said back cover.

[0009] In order to attain said 2nd purpose in an air conditioner concerning this invention, While constituting from a filter, a heat exchanger, a back cover that covers the case rear for a case provided with an air blasting fan, and the front panel which covers case anterior part inside and providing a suction part in anterior part of said front panel, Two or more suction louvers which establish this front panel in said back cover so that opening and closing are removable or possible, conceal said suction part in the 1st state to said suction part, and open said suction part in the 2nd state and which are attached pivotable, It has an interlocking part which interlocks said two or more suction louvers, and said back cover is equipped with a removable filter arranged at anterior part of said heat exchanger, and a louver drive mechanism part which operates said suction louver.

[0010]

[Embodiment of the Invention] Hereafter, the example concerning this invention is described in detail with reference to drawing 1 – drawing 10. The same or same part, an arrow, etc. are shown with identical codes, and the duplicate explanation is omitted.

[0011][The 1st example] Drawing 1 – drawing 8 show one example of the air conditioner concerning this invention, and, as for a side view and drawing 3, drawing 1 is [an appearance perspective view and drawing 2 / a bottom view, drawing 5 – drawing 8 of a top view and drawing 4] important section sectional views.

[0012] First, with reference to drawing 1 – drawing 4, the outline structure of the appearance of the air conditioner concerning this example is explained. In drawing 1, it is an indoor unit of an air conditioner which the numerals 1 show in the gross, and it is connected with the outdoor unit which is not illustrated via refrigerant piping, a power supply connection wire, a signal connection line, etc. which are not illustrated, and it is installed in an indoor wall surface, and gives a subject an indoor air conditioning. The appearance of the indoor unit 1 comprises the back cabinets 3 of a resin mold, the dressing cover 5 of the resin mold formed in the front face of these back cabinets 3, and the front panel 7 of the resin mold established in the front face of this dressing cover 5.

[0013] 9 is a blow-off part arranged by inclining ahead [of the dressing cover 5 / bottom], and is provided with the wind back boards 11a and 11b of the resin mold of two sheets. 13 is the 1st suction part arranged at the transverse-plane lower part of the front panel 7, and this 1st suction part 13 comprises the opening 15 formed in the front face of the front panel 7, and two or more suction louvers 17 attached so that this opening 15 may be plugged up. The suction louver 17 is formed in tabular [oblong], and it is arranged so that a longitudinal direction may be made into right and left and said opening 15 may be divided up and down. This suction louver 17 equips the both-ends lower part of a longitudinal direction with the convex axis of rotation 19 of a couple, and this axis of rotation 19 is supported pivotable by the bearing 21 provided in the both sides of said opening 15 formed in the front panel 7. And by rotating the suction louver 17 via the internal louver drive mechanism part 200 in this indoor unit 1, The opening 15 is plugged up and it enables it to take, as shown in drawing 1, the 1st state flat-tapped with the flat-surface part of the front panel 7, for example, a shutdown state, and the 2nd state that made the lower part fulcrum and opened the upper part ahead (arrow P 2-way), for example, operational status. The front panel 7 is attached to the dressing cover 5 removable so that the upper part of the front panel 7 may be made into a fulcrum, and a lower part may be opened ahead (arrow P1 direction) and said fulcrum can be removed.

[0014] The suction louver 17 is made into the suction louver 17 of the three-sheet composition

which consists of the top suction louver 17a located up, the central suction louver 17b located in the center, and the low suction louver 17c located in the lower part in this example.

[0015]The 2nd suction part 23 and 3rd suction part 25 are formed in the upper surface of the dressing cover 5 and the back cabinets 3. In the center of the lower part of the front panel 4, the indicator 27 which displays an operation condition, and the light sensing portion 29 which receives the manipulate signal of the infrared rays from the remote control of a different body are arranged.

[0016]And the indoor unit 1 concerning this example is made into the appearance shape which made the subject the R provided with the oblong outside dimension which shall set 798 mm and height to 270 mm, and to which it shall be breadth 183 mm in depth. Height is set up corresponding to the narrow wall of the upper part of a window being small in order that housing environment in recent years may secure a big window in this example, It set up so that breadth could be installed in Hanma 910 mm in width (between pillars is a minimum of 800 mm), and depth is set up in consideration of this breadth, restrictions of height, and an internal structure. Since it can install also in said installed environment in which demand is increasing in recent years according to the indoor unit 1 which takes this size system, the diversity of installation can be improved.

[0017]In the shown side view, by drawing 2, the indoor unit 1, While forming the back cabinets 3 in a core box, the upper and lower sides of the dressing cover 5 and the front panel 7, By seeing from the side, being almost symmetrical with the upper and lower sides, forming on the big curved surfaces 31 and 33 narrowed down towards the front, and forming further the front face of the front panel 7 formed among these curved surfaces 31 and 33 on the big, a little leaning back curved surface 35, In the state where it installed in the wall surface, the indoor unit 1 can be shown as the compact gestalt which adapted itself to the wall surface. At this example, the hollow square-shaped curved surface part 41 formed in the circumference of the opening 15 and sectional shape constitute said big curved surface 35 which constitutes the top surface of the front panel in the 1st state that shows in drawing 1 from two or more suction louvers 17 which are in agreement with said big curved surface 35.

[0018]it returns to drawing 2, and further, by having formed the upper surface on the curved surface 31, the 2nd suction part 23 can be boiled as if it is made hard to be conspicuous by an installation condition, and indoor air can be efficiently inhaled from a front upper part. On the other hand, taking advantage of the "field" which adapts itself to installed environment easily, an inclination can be given to the blow-off part 9 by having formed the undersurface on the curved surface 33. While making good the checking and verifying of the front panel 7 and the dressing cover 5 by the indoor unit's 1 making the front panel 7 flat shape with uniform thickness, and forming the slot 37 in a dividing part with the dressing cover 5, An accent line is formed in the big curved surfaces 31 and 33 with the continuous radius of circle, a feeling of depth is reduced, and the compact feeling is raised further. Among a drawing, it deals with 39 for removal of the front panel 7 formed in the both-sides lower part of the dressing cover 5 contiguous to the slot 37, and they are a crevice.

[0019]The 2nd suction part 23 formed in the upper surface of the dressing cover 5 in the top view shown by drawing 3, The 3rd suction part 25 formed in the upper surface of the back cabinets 3 considers it as the grill shape sparsely provided with two or more horizontal frames 43 which serve as a subject, and the stud 45 for reinforcement, is leaving a wide case side to the circumference, and is taken as the gestalt which cannot be easily conspicuous while obtaining a big numerical aperture. The detaching lever 43 which makes the front panel 7 removable is formed in the front both ends of the 2nd suction part 23.

[0020]In the bottom view shown by drawing 4, the blow-off part 9 formed in the undersurface of the dressing cover 5 adjoins a dividing part with the front panel 7, and is arranged. The wind back boards 11a and 11b of two sheets are provided with the band-like gestalt provided with the almost same curved surface as the big curved surface 33, conceal the opening of the blow-off part 9 mostly by eyelid completely closure, and form the big curved surface 33 which followed the bottom of the indoor unit 1. And the wind back boards 11a and 11b make a fulcrum the axis of rotation which was provided in both ends and which is not illustrated, open and close the

blow-off part 9 corresponding to an air conditioning at the time of operation, and are controlled via the drive motor which is not illustrated to close the opening of the blow-off part 9 at the time of shutdown.

[0021]Thus, the appearance of the indoor unit 1 concerning this example, The upper surface and the bottom are narrowed down towards the front via a big curved surface, and transverse-plane 4 corner considers it as the compact gestalt symmetrical with four-directions **** which made the keynote the round formed in big radius-of-circle shape, The blow-off part 9, the 1st, 2nd, and 3rd suction part 13, 23, and 25, the indicator 27, and the light sensing portion 29 which are arranged at the front are symmetrically arranged on the basis of a center.

[0022]According to the indoor unit 1 concerning this example, the blow-off part 9 and the 1st suction part 13 which are visible according to an installation condition in the time of a stop And the wind back board 11a, While concealing by 11b and the suction louver 17, making it harmonize with a room interior design and opening the wind back boards 11a and 11b corresponding to an air conditioning at the time of operation, The suction louver 17 can be opened, indoor air can be made into cold blast or warm air by the heat exchanger 47 inside absorption from the 1st suction part 13 and 2nd and 3rd suction part 23 and 25, and it can blow off from the aforementioned blow-off part 9. While making said work easy according to this indoor unit 1 to make the upper part into a fulcrum for the front panel 7 in the case of filter replacement or an internal maintenance, to open the lower part wide, and to do, Leaving the louver drive mechanism part 200 to the dressing cover 5 side, the front panel 7 provided with the suction louver 17 can be removed independently, and can be washed and cleaned.

[0023]Next, with reference to drawing 5 – drawing 8, the inner structure and the louver drive mechanism part 200 of the indoor unit 1 are explained.

[0024]In drawing 5, fundamental internal structure objects, such as the flowing-through fan 45, the heat exchanger 47, the drain pans 49a and 49b, the wind back boards 11a and 11b, are attached inside the back cabinets 3. And the fundamental internal structure object of flowing-through fan 45 grade attached inside the back cabinets 3 is included in the indoor unit 1 by attaching the dressing cover 5. The dressing cover 5 forms an attachment rib in top both sides, can scratch this attachment rib to the anterior part of the 3rd suction part 25, and attaches the lower part to the back cabinets 3 via a screw etc.

[0025]The drive mechanism part 200 which makes the suction louver 17 drive, the filter 51 attached removable via the guiding rail which was formed in the both-sides wall of the dressing cover 5, and which is not illustrated, and said indicator 27 and the light sensing portion 29 are attached to the dressing cover 5. Said louver drive mechanism part 200 is provided with the drive motor 201, the gear 203 attached to this drive motor 201, and the board gear 205 which meshes with this gear 203, and comprises the rack 207 formed in the both sides of the suction louver 17 movable up and down, and coupling rod 209 grade. Said gear 203 and the rack 207 are formed in the both sides of the suction louver 17, and the drive motor 201 is formed so that it may gear with one gear 203. And the running torque of the drive motor 201 is transmitted to said rack 207 which formed the gear 203 of a couple, and the meshing gear 211 in both sides with the coupling rod 209 formed in both ends.

[0026]The front panel 7 is attached can open and close the lower part of the front panel 7, and removable via the hinge region 250 provided in the inner top. This front panel 7 opens simply, or is kept from vibrating [by providing the height which is not illustrated inside / lower / the front panel 7, and establishing the crevice which engages with said height in the position of this height and the corresponding dressing cover 5] here at the time of operation at the time of attachment of the front panel 7. It is attached to the front panel 7 so that two or more suction louvers 17 may carry out ganged operation via the interlock plate 301 formed in the both sides of the longitudinal direction of this suction louver 17. The height 302 is formed, the connecting part 300 which can be detached and attached freely is constituted from this height 302 carrying out checking and verifying to the concave checking-and-verifying part 213 formed in said rack 207, the torque of the rack 207 is transmitted to the interlock plate 301, and the switching action of the suction louver 17 is carried out to the interlock plate 301.

[0027]Next, with reference to drawing 6, the structure of the hinge region 250 is explained in

detail. In drawing 6, it has formed the hinge region 250 each in one top both sides of the front panel 7, and the side shape in which this hinge region 250 is formed in the both-sides upper part of the front panel 7 -- being circular (refer to drawing 5) -- with the supporting ribs 251 formed by projecting back. The convex axis of rotation 253 provided in the tip outside of these supporting ribs 251, and the bearing part 255 attached to the dressing cover 5 in support of this axis of rotation 253 so that sliding of axis-of-rotation 253 direction (the arrow P3, P4 direction) is possible, The bearing attaching part 257 which holds this bearing part 255 to the dressing cover 5 so that sliding is possible, The coil spring 259 attached so that it may be provided in the bearing part 255, the bearing part 255 may always be extruded in the arrow P3 direction and the axis of rotation 253 may be held, It comprises the detaching lever 43 which is provided in said bearing part 255 and provided in the lever hole 261 of the upper surface of the dressing cover 5 by exposing with the bearing part 255 so that sliding is possible.

[0028]According to the hinge region 250 concerning this example, the axis of rotation 253 is held at the front face of the dressing cover 5 via the bearing part 255 extruded in the arrow P3 direction with the stress of the coil spring 259. The axis of rotation 253 established at the tip of the supporting ribs 251 is supported by the bearing part 255 pivotable, is **, and can open at the time of exchange of the filter 51 and close the front panel 7. Since the checking and verifying of the axis of rotation 253 and the bearing part 255 can be removed by extruding the detaching lever 43 in the arrow P4 direction with a finger etc., they can remove the front panel 7 from the dressing cover 5 easily.

[0029]Next, with reference to drawing 7 and drawing 8, louver drive mechanism is explained in detail. First, in drawing 7 in which the cross section of the louver drive mechanism part 200 is shown, the drive motor 201 with which the gear 203 is attached is attached to one side of the reinforcing rib 214 inside the dressing cover 5 via a screw etc. The gear 203 attached to other one side is attached to said reinforcing rib 214 by the bearing which holds the gear 203 instead of the drive motor 201 enabling free rotation and which is not illustrated. The coupling rod 209 adjoins said gear 203, and is attached to the attachment rib 215 formed in the reinforcing rib 214. And it is made for the gear 211 provided in the both ends of the coupling rod 209 and said gear 203 to mesh. By such a structure, the running torque of the drive motor 201 is uniformly transmitted to the gear 203 indirectly provided in both sides via direct or the coupling rod 209.

[0030]In this example, since the heat exchanger 47 was arranged between the gears 203, transmitted running torque to the gear 203 of another side via the coupling rod 209, but. For example, the louver drive mechanism part 200 may be located above the heat exchanger 47, the axis of rotation of the drive motor 201 may be extended, and the two gears 203 may be attached. When the running torque of a drive motor runs short, two or more gears may be combined.

[0031]the rack 207 provided with the board gear 205 which meshes with said gear 203 is supporting the sliding groove 217 formed in both sides with the rack supporter 219 formed in said reinforcing rib 214 -- a sliding direction (drawing kickback back) -- it is supported movable. The running torque of the drive motor 201 is changed into up-and-down sliding operation by the rack 207 by this structure.

[0032]the interlock plate 301 provided with the height 302 which carries out checking and verifying to the concave checking-and-verifying part 213 of said rack 207 on the other hand is supporting with the connecting-plate supporter 305 in which the sliding groove 303 formed in both sides is established inside the front panel 7 -- a sliding direction (drawing kickback back) -- it is supported movable. The suction louver 17 supported by the bearing 21 of said opening 15 pivotable via the axis of rotation 19 is connected with said interlock plate 301 via the interlocking shaft 307 formed in the both-ends lower end of the suction louver 17 by projecting inside. This structure is explained more to details with reference to drawing 8.

[0033]In drawing 8, the interlocking shaft 307 is attached to the slide hole 309 formed in the interlock plate 301 so that sliding of a cross direction (arrow) is possible. From the connecting-plate sliding direction Y (the vertical position of a suction louver, and abbreviated coincidence), and the right-angled horizon X, the back of the sliding shaft line Q1 of the slide hole 309 is made to incline angle theta1 caudad, and this slide hole 309 forms it. He is trying for the axis Q2 which

connects the interlocking shaft 307 and the axis of rotation 19 to the louver closed position side Y2 almost parallel to the connecting-plate sliding direction Y to serve as the connecting-plate sliding direction Y and the angle theta 2 by projecting the interlocking shaft 307 X1 back (drawing top right-hand side) from the axis of rotation 19, and being provided. And it has set up so that the angle theta of said axis Q2 and the sliding shaft line Q1 may be not less than 90 degrees.

[0034]By this structure, by moving the interlock plate 301 to the connecting-plate sliding direction Y (sliding direction), Since the interlocking shaft 307 can move smoothly in the slide hole 309 and the orbit Q3 top which shows the interlocking shaft 307 as a result by the dotted line which makes the axis of rotation 19 a fulcrum can be moved, the suction louver 17 can be opened and closed with small torque. Although the angle theta 1 and theta 2 were set up and the angle theta is set as not less than 90 degrees in this example, what is necessary is for the angle theta just to be not less than 90 degrees as a result, and the angle theta 1 and either of theta 2 may be set as 0 degree. Although the sliding surface 311 of the slide hole 309 is made into the inclining straight line in this example, the effect same also as the slide hole 309 caudad provided with the circular face of a convex for this sliding surface 311 seen from the side can be acquired. In this example, the migration length of the interlock plate 301 and the size of the slide hole 309 are determined so that rotation rotation of about 45 degrees of the suction louvers 17 may be carried out.

[0035]Next, with reference to drawing 5 and drawing 8, operation of the indoor unit 1 concerning this example is explained.

[0036]First, the indoor unit 1 equips with a control board the electronic-autoparts box which is not illustrated inside, In response to the manipulate signal from a remote control, the microcomputer formed in this control board generalizes the indoor unit 1, and controls operation of a fan motor, the louver drive mechanism part 200, the wind back boards 11a and 11b, various kinds of sensors, etc. by the light sensing portion 29.

[0037]The indoor unit 1 is a shutdown state and is in the 1st state where suction RUBA 17 and the wind back boards 11a and 11b were closed, as [show / in drawing 1]. If the signal of operation is made from a remote control in this state, the microcomputer which is not illustrated, If the manipulate signal from a remote control or automatic operation is set up, based on the information from that of a various sensor Heating and cooling, Or the modes of operation, such as heating, are determined, suction RUBA 17 and the wind back boards 11a and 11b are operated based on this determination, and it is made to operate so that the 2nd state where suction RUBA 17 and the wind back boards 11a and 11b opened wide may be taken.

[0038]That is, a microcomputer operates the drive motor which is not illustrated and opens the wind back boards 11a and 11b to the blow-off angle corresponding to the mode of operation. A microcomputer operates the drive motor 201 which is interlocked with operation of said wind back boards 11a and 11b, and opens the suction louver 17. The running torque of the drive motor 201 is transmitted to the gear 203 arranged on both sides via the coupling rod 209 provided with the gear 211, the same rotation of the gear 203 of a couple is carried out, and a sliding direction operates the rack 207 along with the rack supporter 219 via the board gear 205. And by the checking and verifying of the checking-and-verifying part 213 and the height 302, a motion of this rack 207 operates the interlock plate 301 to a sliding direction, moves the interlocking shaft 307 of two or more suction louvers 17 along the slide hole 309, the axis of rotation 19 is made into a fulcrum, and opens it wide, and changes the suction louver 17 into the 2nd state.

[0039]next -- a microcomputer rotates the flowing-through fan 45 and inhales indoor air from the 1st, 2nd, and 3rd suction part 13, 23, and 25 -- the heat exchanger 47 -- warm air or cold blast -- or -- without it carries out heat exchange -- a wind direction -- it controls to make it blow off from the blow-off part 9 along with the boards 11a and 11b. On the other hand, when suspending operation, after stopping a flowing-through fan, it controls to return the drive motor 203 and the drive motor of the wind back boards 11a and 11b to the 1st state from the 2nd state by carrying out counterrotation.

[0040]Thus, in the 1st state of being a shutdown state according to the indoor unit 1 concerning this example, An inside the 1st suction part 13 and blow-off part 9 to expose by an installation

condition The suction louver 17 and the wind back board 11a, Since it can conceal via 11b at the case side of the indoor unit 1, and the flat surface which makes the same side mostly, familiarize the indoor unit 1 with a flat-surface subject's wall surface, it is made to harmonize with indoor interior design, and penetration of the dust from the 1st suction part 13 and the blow-off part 9, etc. can be reduced further.

[0041]Since the suction louver 17 of the 1st suction part 13 can be opened wide, a numerical aperture can be enlarged 2nd in the state of operational status on the other hand in addition to the 2nd and 3rd suction part 23 and 25 that is always carrying out the opening and indoor air can be inhaled from a large area, Blowing resistance can be made small and air conditioning capacity and noise can be reduced. Since especially the suction louver 17 is divided into plurality up and down, it can make small the projection amount of the suction louver 17 to the front at the time of opening the suction louver 17 wide. Since the suction louver 17 opens the upper part of the suction louver 17 wide and is opened wide aslant, By an installation condition, even if it looks up from a lower part, while being able to make it hard to be visible in the inside of the 1st suction part 13, the emitted air can reduce the short circuit immediately absorbed by the 1st suction part 13. In addition, since the lower part of the suction louver 17 is considering it as the structure of entering inside when the axis of rotation 19 is formed in the central twist of the side edge part of the suction louver 17 and is wide opened in this example, The projection amount of the suction louver 17 to the front at the time of opening wide can be made still smaller, and the feeling of oppression by the suction louver 17 grade at the time of wall surface installation projecting ahead greatly can be reduced.

[0042]In this example, although he is trying to open simultaneously the wind back boards 11a and 11b and the suction louver 17, after operating the wind back boards 11a and 11b, the suction louver 17 may be operated, the simultaneous operation of two drive motors may be lost, and the maximum dissipation may be reduced. It may be made to shorten said time to get warm by closing the suction louver 17 until the heat exchanger 47 gets warm at a heating period especially. It may be made to perform the time of feeble-minded power operation with sufficient time efficiency at least, and blowing operation in the 1st state.

[0043]Next, with reference to drawing 5 and drawing 8, attachment and detachment of the filter 51 and the front panel 7 are explained.

[0044]It is the upper part's being attached to the front panel 7 of this example via the hinge region 250, and the lower part's providing the height which is not illustrated inside, and establishing the crevice which engages with said height in the position of this height and the corresponding dressing cover 5, This front panel 7 opens simply, or is kept from vibrating at the time of operation at the time of attachment of the front panel 7.

[0045]Therefore, when detaching and attaching the filter 51, it is in the 1st state and is handling and removing engagement of said height and a crevice via the crevice 39, Since the axis of rotation 253 of said hinge region 250 can be made into a fulcrum for the front panel 7 and the lower part of the front panel 7 can be opened greatly, After it pulls out the filter 51 simply from this portion opened wide greatly and the filter 51 cleans, along with a guiding rail, it can equip with the filter 51 easily again. And since it is not necessary to make the filter 51 located in this detaching operation behind the 1st suction part 13 arranged at the 3rd and 2nd suction parts 25 and 23 on top and transverse plane crooked greatly, and to make it pull out from the blow-off part 9 provided in the bottom, It cannot be forced the unnecessary stress to the filter 51, and also scattering of the dust at the time of crookedness, etc. can be reduced, and it can detach and attach comfortably from large space. By opening of the front panel 7, since the front face of the dressing cover 5 can be exposed, this exposed portion, for example, the guiding rail which the filter 51 does not illustrate, and the dust adhering to the heat exchanger 47 grade which was not removed with the filter 51 can be cleaned with a cleaner etc.

[0046]The louver drive mechanism part 200 to which the movement mechanism of the suction louver 17 is attached by the dressing cover 5 in this example, The height 302 which dissociates and provides in the interlocking part 301 attached to the front panel 7, and is formed in the interlock plate 301 in this louver drive mechanism part 200 and the interlocking part 301, It is an easy structure, and, moreover, the connecting part 300 can be detached [since it has

connected by the disengageable connecting part 300 which transmits operation by checking and verifying with the concave checking-and-verifying part 213 of the rack 207] and attached based on the switching action of the front panel 7. In addition, since two or more suction louvers 17 are interlocking, in wearing of the front panel 7, by shutting the suction louver 17 of at least one sheet, they can shut other suction louvers 17 and, moreover, can perform alignment of the connecting part 300 easily.

[0047]An opening angle locking mechanism is provided in the hinge region 250, and it may be made to maintain an opened condition for the front panel 7. What is necessary is to provide the height and crevice which are not illustrated as this opening angle locking mechanism to the ***** supporting ribs 251 of the axis of rotation 253 and the sliding surfaces 260a and 260b of the bearing part 255 which are shown in drawing 6, for example, to carry out checking and verifying at an angle of predetermined, and just to make it lock.

[0048]Next, in this example, by extruding the detaching lever 43 provided in the both-sides anterior part of the 2nd suction part 23 on both sides, the front panel 7 can be removed from the dressing cover 5, as the dotted line of drawing 5 showed, and it can wash whole with a sink etc. Under the present circumstances, since it is left behind to the dressing cover 5 and the electrical transmission article is not provided in the front panel 7, the louver drive mechanism part 200 cannot care about them, and can clean removal of wiring and permeation of the water to the electrical transmission article at the time of washing. And since two or more suction louvers 17 are connected by the interlocking part 301 when detaching and attaching, while it is mitigable for each suction louver 17 to vary and to disperse dust, as described above, alignment of the connecting part 300 at the time of wearing can be performed easily.

[0049][Other Example(s)]Next, with reference to drawing 9 and drawing 10, other examples of the air conditioner concerning this invention are described. Drawing 9 is a fragmentary sectional view of the suction louver 17 concerning other examples, and drawing of longitudinal section of the air conditioner which requires drawing 10 for other examples.

[0050]First, it makes it harder to be for the suction louver 400 shown by drawing 9 to be making the lower end part of the suction louver 400 into a fulcrum, and providing it so that opening and closing are possible, to be an installation condition, and visible in the inside of the 1st suction part 13. In the figure, the suction louver 400 formed the axis of rotation 19 provided in both ends in the lower end part, and only X2 projected the interlocking shaft 307 behind the axis of rotation 19, and it has provided it. The interlocking shaft 307 is attached to the slide hole 309a formed in the interlock plate 301a so that sliding of a cross direction (arrow) is possible. From the connecting-plate sliding direction Y (the vertical position of a suction louver, and abbreviated coincidence), and the right-angled horizon X, the upper part is made to do the angle theta1a inclination of the back of the sliding shaft line Q1a of the slide hole 309, and this slide hole 309 forms it in it. And it has set up so that angle thetaaa of the connecting-plate sliding direction Y and the sliding shaft line Q1a may be 90 degrees or less.

[0051]By this structure, by moving the interlock plate 301 to the connecting-plate sliding direction Y (sliding direction), Since the interlocking shaft 307 can move smoothly in the slide hole 309 and the orbit Q3a top which shows the interlocking shaft 307 as a result by the dotted line which makes the axis of rotation 19 a fulcrum can be moved, the suction louver 17 can be opened and closed with small torque.

[0052]Thus, by setting up the sliding shaft line Q1a in this example the interlocking shaft 307 be movable to the connecting-plate sliding direction Y and a counter direction in the relative relation between the interlock plate 301 and the interlocking shaft 307. Since the interlocking shaft 307 can carry out the sliding surface 311 that it is easy to be easy to move, torque of the louver drive mechanism part 200 at the time of start up can be made small.

[0053]The indoor unit 1 shown by drawing 10 shows other examples of a louver drive mechanism part. The louver drive mechanism part 500 concerning this example, It is attached movable with the drive motor 501 attached to the dressing cover 5, the gear 502 linking directly to the axis of rotation of the drive motor 501, and the guiding rail which is not illustrated to the dressing cover 5 at a cross direction, and comprises the rack 504 provided with the board gear 503 which meshes with said gear 502. The spring 504 which is going to pull the interlock plate 301 and is

going to close the suction louver 17 is formed in the lower end part of the interlock plate 301 which interlocks two or more suction louvers 17.

[0054]Now, according to this example, in the 1st state, the tip of the rack 504 is stored in a main part, and the suction louver 17 is closed by the spring 504. Next, if the drive motor 501 operates, the tip of the rack 504 will be extruded ahead and other suction louvers 17 will be wide opened via the interlock plate 301 by making the axis of rotation 19 into a fulcrum, and opening the suction louver 17 in contact with the inside of the suction louver 17 of one sheet. When closing the suction louver 17, the spring 504 can close the suction louver 17 by drawing the rack 504. The rack 504 may provide the gear 502 grade of the couple which could be provided in the center of the suction louver 17, and was directly linked with the axis of rotation of said coupling rod 209 or the drive motor 501, and may form the rack 504 in the both sides of the suction louver 17.

[0055]Although it is considered as the dressing cover 5 and the structure which separated the back cabinets 3, the back cover made into integral construction may constitute the member from the aforementioned example.

[0056]Although the example which formed the 2nd and 3rd suction part 23 and 25 in the upper surface of the case explained in said example, even if it does not form the 2nd and 3rd suction part 23 and 25, there is same effect. When forming said 2nd and 3rd suction part 23 and 25, the top plate provided with the suction parts 23 and 25 is formed with the same structure as removable as the dressing cover 5, By providing the suction louver which can be opened and closed and which equipped the suction parts 23 and 25 with the same structure as said example, permeation to the inside of dust is reduced, and it can demount further and can clean. The effect described above by supposing that the front panel 7 which carried out the same embodying as made said top plate the front panel 7 and integral construction can be opened and closed, and it is removable can be heightened further.

[0057]

[Effect of the Invention]Improving the design nature of an external design according to the 1st invention, when front panel wearing is carried out. Since the suction louver which can be opened and closed can be separated from the drive mechanism part of a suction louver with an easy structure, and it can leave this drive mechanism part to the case side and the front panel can be detached and attached, cleaning of the front panel or case anterior part can be made easy.

[0058]Improving the design nature of an external design according to the 2nd invention, when it equips with the front panel. Since the suction louver which can be opened and closed can be separated from the drive mechanism part of a suction louver with an easy structure, and it can leave this drive mechanism part to the case side and attachment and detachment or opening and closing of the front panel can be enabled, attachment and detachment of a filter can be made easy and cleaning nature can be raised.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]The appearance perspective view showing one example of the air conditioner concerning this invention.

[Drawing 2]The side view showing one example of the air conditioner concerning this invention.

[Drawing 3]The top view showing one example of the air conditioner concerning this invention.

[Drawing 4]The bottom view showing one example of the air conditioner concerning this invention.

[Drawing 5]Drawing of longitudinal section showing one example of the air conditioner concerning this invention.

[Drawing 6]The important section fragmentary sectional view showing one example of the air conditioner concerning this invention.

[Drawing 7]The important section partial cross-sectional view showing one example of the air conditioner concerning this invention.

[Drawing 8]The important section fragmentary longitudinal cross-section showing one example of the air conditioner concerning this invention.

[Drawing 9]Drawing of longitudinal section showing other examples of the air conditioner concerning this invention.

[Drawing 10]The important section fragmentary longitudinal cross-section showing other examples of the air conditioner concerning this invention.

[Description of Notations]

1 [-- A blow-off part, 13 / -- The 1st suction part, 15 / -- An opening, 17 / -- A suction louver, 19 / -- The axis of rotation, 21 / -- A bearing, 200 / -- A louver drive mechanism part, 250 / -- A hinge region, 300 / -- A connecting part, 301 / -- Interlocking part.] -- An indoor unit, 3 back cabinets, 5 -- Makeup hippo --, 7 -- The front panel, 9

[Translation done.]

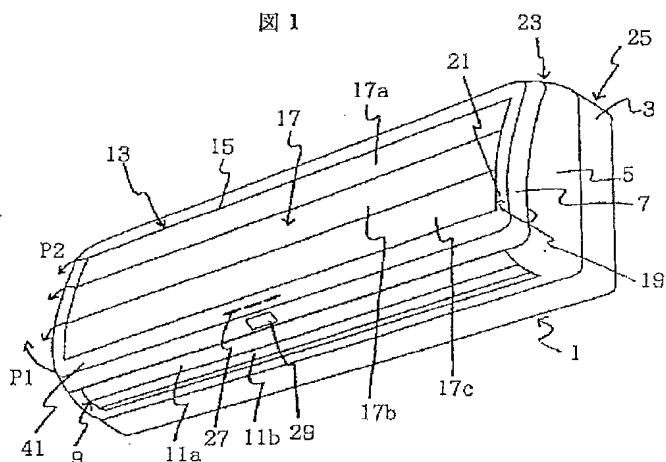
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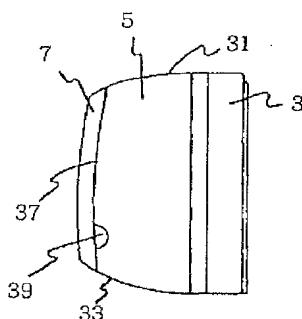
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DRAWINGS

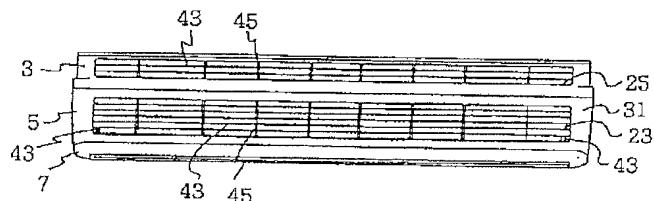
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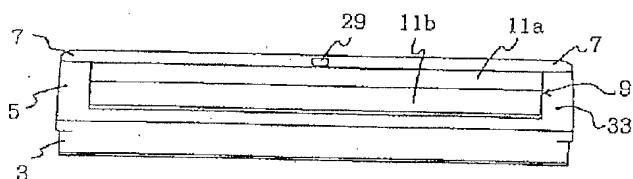
[Drawing 2]
図 2



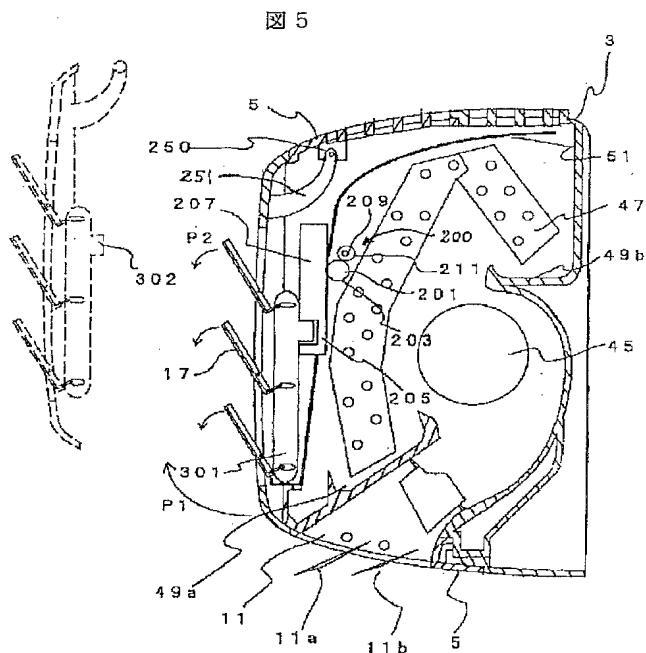
[Drawing 3]
図 3



[Drawing 4]
図 4

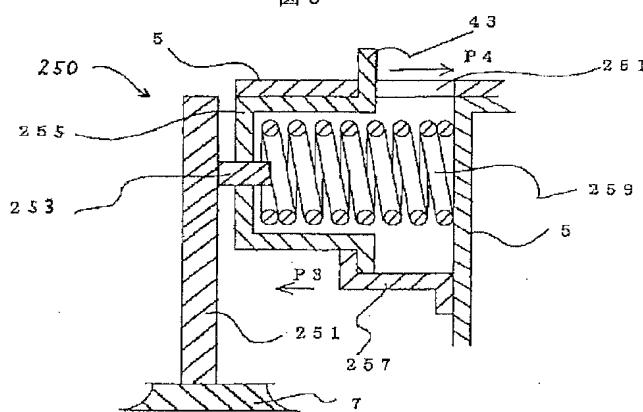


[Drawing 5]



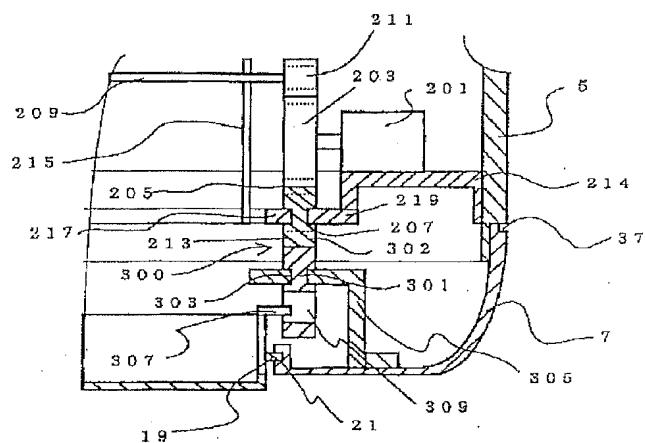
[Drawing 6]

図 6



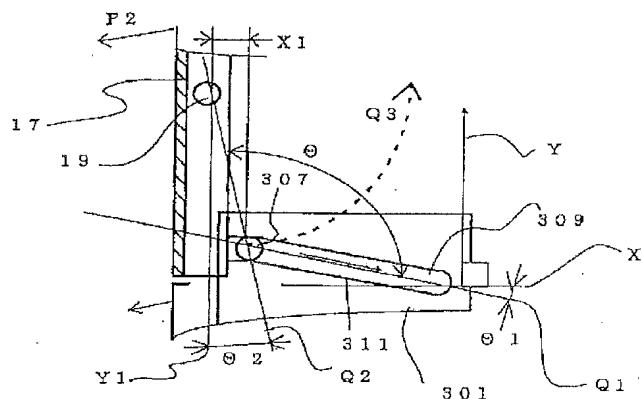
[Drawing 7]

図 7



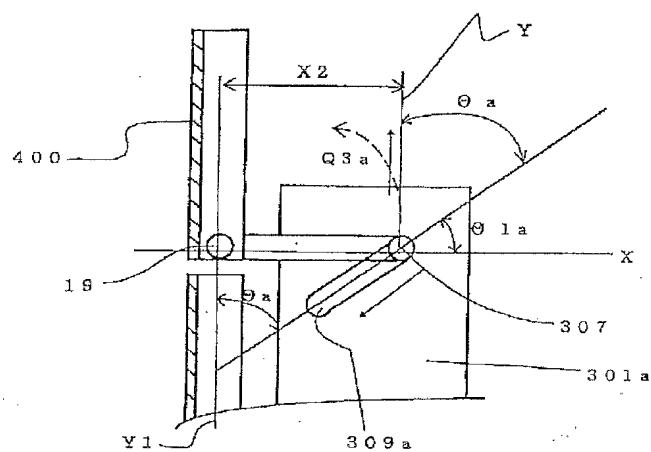
[Drawing 8]

図 8



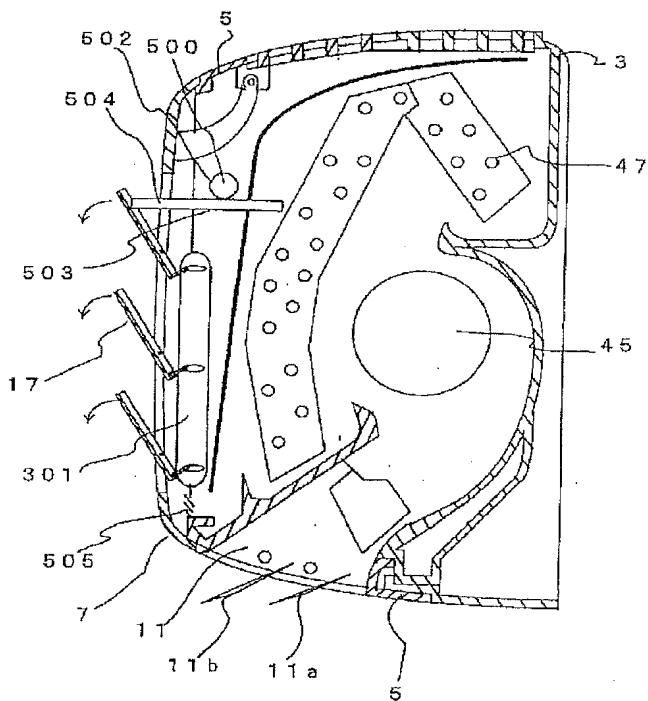
[Drawing 9]

図 9



[Drawing 10]

図 10



[Translation done.]

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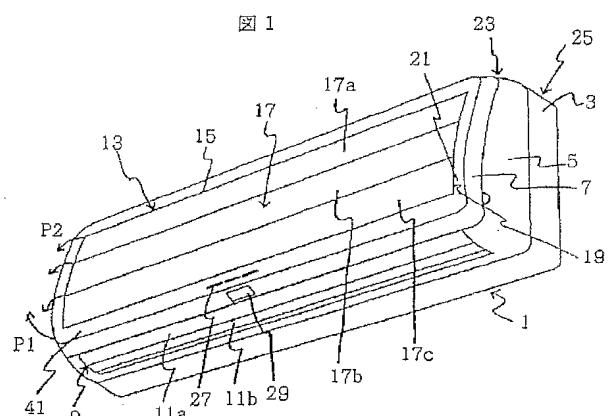
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(54)【発明の名称】 空気調和機

(57)【要約】

【課題】空気調和機において、フロントパネルを応力により保持し、フロントパネルを開放可能してフィルタの着脱を容易にし、フロントパネルを簡単に着脱して清掃を容易にする。

【解決手段】着脱可能なフィルタ51を備えた空気調和機内部において、フロントパネル7を、バックカバーにヒンジ部250を介して上部を支点にして下部を開放可能に、かつ着脱可能に設け、ヒンジ部250にバックカバーに応力による保持及びその解除可能な機構を備える。



【特許請求の範囲】

【請求項1】内部にフィルタと熱交換器と送風ファンを備えた筐体を、バックカバーとフロントパネルとから構成し、前記フロントパネルは、その前部に吸込部を設けるとともに、前記バックカバーに、ヒンジ部を介して、上部を支点にして下部を開放可能に、かつ着脱可能に設け、前記ヒンジ部は、前記フロントパネルを前記バックカバーに応力による保持及びその解除可能な機構を備え、前記バックカバーは、前記熱交換器の前部に配置される着脱可能なフィルタを備えたことを特徴とする空気調和機。

【請求項2】前記ヒンジ部は、両側上部に設けられる支持リブと、該支持リブに設けられる回転軸と、該回転軸を応力により支持する軸受部と、該軸受部に設けられる解除レバーとを有することを特徴とする請求項1に記載の空気調和機。

【請求項3】内部にフィルタと熱交換器と送風ファンを備えた筐体を、バックカバーとフロントパネルとから構成し、前記フロントパネルは、その前部に吸込部を設けるとともに、前記バックカバーに、ヒンジ部を介して、上部を支点にして下部を開放可能に、かつ着脱可能に設け、前記ヒンジ部は、前記フロントパネルを前記バックカバーに保持及びその解除可能な機構を備え、前記吸込部は、開口部と、第1の状態で前記開口部を隠蔽し、第2の状態で前記開口部を開放するように回転可能に取付けられる複数の吸込ルーバーと、前記複数の吸込ルーバーを連動させる連動部とを備え、前記バックカバーは、前記熱交換器の前部に配置される着脱可能なフィルタと、前記吸込ルーバーを動作させるとともに、前記フロントパネルと分離可能なルーバー駆動機構部とを備えたことを特徴とする空気調和機。

【請求項4】前記フロントパネルは、その下部内側にバックカバーの凹部に係合する突起部を設けることを特徴とする請求項1～3の何れかに記載の空気調和機。

【請求項5】内部にフィルタと熱交換器と送風ファンを備えた筐体を、バックカバーとフロントパネルとから構成し、前記フロントパネルは、その前部に吸込部を設けるとともに、前記バックカバーに、ヒンジ部を介して、上部を支点にして下部を開放可能に設け、前記フロントパネルが所定角度で開放状態を維持する開放角度ロック機構を設け、前記ヒンジ部は、前記フロントパネルを前記バックカバーに応力による保持及びその解除可能な機構を備え、前記吸込部は、開口部と、第1の状態で前記開口部を隠蔽し、第2の状態で前記開口部を開放するよう回転可能に取付けられる複数の吸込ルーバーと、前記複数の吸込ルーバーを連動させる連動部とを備え、前記バックカバーは、前記熱交換器の前部に配置される着脱可能なフィルタと、前記吸込ルーバーを動作させるとともに、前記フロントパネルと分離可能なルーバー駆動機構部とを備えたことを特徴とする空気調和機。

【請求項6】前記バックカバーは、前記熱交換器と前記送風ファンが取付けられるバックキャビネットと、該バックキャビネットの前部に配置され、前記ルーバー駆動機構部と前記フィルタが取付けられる化粧カバーとから構成することを特徴とする請求項1～5の何れかに記載の空気調和機。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】内部にフィルタと熱交換器と送風ファンを備えた筐体の前面に複数の開閉可能な吸込ルーバーを設けて、運転停止状態では前記吸込ルーバーを開めて意匠性を高め、運転状態では前記吸込ルーバーを開いて運転効率を向上した空気調和機に係り、特に、清掃性とフィルタ交換を容易にした空気調和機に関するものである。

【0002】

【従来の技術】従来の空気調和機では、壁面に取付けられる筐体の前面に設けた吸込部に複数の回転可能な吸込ルーバーを設け、吹出部に設けた風向板の吹出し角度と、上記吸込ルーバーの吸込み角度を連動するようにして、運転停止時は吸込ルーバーを閉鎖して塵埃等の侵入を防ぐとともに、吸込部を平板状としてデザイン性を高め、運転時は性能を向上させるようにしたものがある。また、これらの空気調和機では、フィルタの着脱を吹出部から行うものが一般的である。

【0003】前記従来例は、例えば、特開平1-95249号及び特開昭64-41729号等の公開公報に記載されている。

【0004】

【発明が解決しようとする課題】しかし、前記従来例では、吸込ルーバーが筐体の前面に直接取付けられているために、吸込ルーバーに付着した塵埃を取り除く場合は、壁面に取付けられる筐体の前面を雑巾で拭く等の、高所での作業が強いられるため清掃作業性に問題があるばかりか安全性にも課題がある。

【0005】また、従来例では、頻繁に清掃が必要なフィルタの着脱を狭い吹出部の隙間から行わなければならないためにフィルタの着脱がしづらかった。特に、近年の主流になっている、断面形状が貫流ファンを包むように多段階に折り曲げる熱交換器を採用した空気調和機では、前記熱交換器を覆うために、フィルタを熱交換器を包みように大きく湾曲させなければならず、この湾曲したフィルタを吹出部の狭い隙間から着脱させるのは使い勝手的にも、構造的にも、あるいは、着脱時のフィルタからの塵埃の飛散等の面からも課題がある。

【0006】本発明の第1の目的は、意匠性を高めつつ、吸込ルーバーの清掃性を向上した空気調和機を提供することにある。

【0007】本発明の第2の目的は、意匠性を高めつつ、フィルタの着脱を容易にする空気調和機を提供する

ことにある。

【0008】

【課題を解決するための手段】前記第1の目的を達成するために、本第1の発明に係る空気調和機では、内部にフィルタと熱交換器と送風ファンを備えた筐体を、筐体後部をカバーするバックカバーと、筐体前部をカバーするフロントパネルとから構成し、前記フロントパネルの前部に吸込部を設けるとともに、該フロントパネルを前記バックカバーに着脱可能に設け、前記吸込部に、第1の状態で前記吸込部を隠蔽し、第2の状態で前記吸込部を開放する回転可能に取付けられる複数の吸込ルーバーと、前記複数の吸込ルーバーを連動させる連動部とを備え、前記バックカバーに前記吸込ルーバーを動作させるルーバ駆動機構部を備えるようにする。

【0009】また、本発明に係る空気調和機では、前記第2の目的を達成するために、内部にフィルタと熱交換器と送風ファンを備えた筐体を、筐体後部をカバーするバックカバーと、筐体前部をカバーするフロントパネルとから構成し、前記フロントパネルの前部に吸込部を設けるとともに、該フロントパネルを前記バックカバーに着脱可能または開閉可能に設け、前記吸込部に、第1の状態で前記吸込部を隠蔽し、第2の状態で前記吸込部を開放する回転可能に取付けられる複数の吸込ルーバーと、前記複数の吸込ルーバーを連動させる連動部とを備え、前記バックカバーに、前記熱交換器の前部に配置される着脱可能なフィルタと、前記吸込ルーバーを動作させるルーバ駆動機構部を備えるようにする。

【0010】

【発明の実施の形態】以下、本発明に係る実施例を図1～図10を参照して詳細に説明する。なお、同一または同様な部位、矢印等は同一符号をもって示し、重複した説明を省略する。

【0011】〔第1の実施例〕図1～図8は本発明に係る空気調和機の一実施例を示すものであり、図1は外観斜視図、図2は側面図、図3は平面図、図4は底面図、図5～図8は要部断面図である。

【0012】先ず、図1～図4を参照して、本実施例に係る空気調和機の外観の概略構造を説明する。図1において、符号1で総括的に示すのは空気調和機の室内ユニットであり、図示しない冷媒配管、電源接続線、信号接続線等を介して図示しない室外ユニットと接続され、室内的壁面に設置されて、室内の冷暖房を主体に行うものである。室内ユニット1の外観は、樹脂成型のバックキャビネット3と、該バックキャビネット3の前面に設けられる樹脂成型の化粧カバー5と、該化粧カバー5の前面に設けられた樹脂成型のフロントパネル7とから構成されている。

【0013】9は化粧カバー5の底面前方に傾斜して配置される吹出部であり、2枚の樹脂成型の風向板11a、11bを備えている。13はフロントパネル7の正

面下方に配置される第1の吸込部であり、該第1の吸込部13は、フロントパネル7の前面に形成される開口部15と、該開口部15を塞ぐように取付けられる複数の吸込ルーバー17とから構成される。吸込ルーバー17は、横長の板状に形成され、長手方向を左右にして前記開口部15を上下に分割するように配置される。この吸込ルーバー17は、長手方向の両端部下方に一对の凸状の回転軸19を備え、該回転軸19はフロントパネル7に形成される前記開口部15の両側に設けられる軸受21に回転可能に支持される。そして、この室内ユニット1では、内部のルーバー駆動機構部200を介して吸込ルーバー17を回転させることにより、図1に示すよう開口部15を塞いでフロントパネル7の平面部と面一な第1の状態、例えば運転停止状態と、下方を支点にして上部を前方(矢印P2方向)に開いた第2の状態、例えば運転状態とを取れるようしている。更に、フロントパネル7は、フロントパネル7の上部を支点にして下方を前方(矢印P1方向)に開き、かつ、前記支点を取り外せるよう着脱可能に化粧カバー5に取付けられている。

【0014】なお、この実施例では、吸込ルーバー17を、上方に位置する上部吸込ルーバー17aと、中央に位置する中央吸込ルーバー17bと、下部に位置する下部吸込ルーバー17cとからなる3枚構成の吸込ルーバー17としている。

【0015】また、化粧カバー5とバックキャビネット3の上面には第2の吸込部23と第3の吸込部25が形成されている。また、フロントパネル4の下部中央には運転状況を表示する表示部27と、別体のリモコンからの赤外線の操作信号を受ける受光部29が配置されている。

【0016】そして、この実施例に係る室内ユニット1は、横幅を798mm、高さを270mm、奥行を183mmとする横長の外形寸法を備えたアールを主体とした外観形状としている。本実施例では、近年の住宅環境が大きな窓を確保するために窓の上部の小壁が小さくなっていることに対応して高さを設定し、また横幅を半間幅910mm(柱の間が最小800mm)に設置できるように設定し、該横幅と高さの制約と内部構造とを考慮して奥行を設定している。この寸法体系をとる室内ユニット1によれば、近年需要が高まっている前記設置環境にも設置できるので、設置の多様性を向上できる。

【0017】図2で示す側面図において、室内ユニット1は、バックキャビネット3を箱型に形成するとともに、化粧カバー5とフロントパネル7の上下面を、側面から見て、ほぼ上下対称で前方に向けて絞り込まれる大きな曲面31、33で形成し、更に、該曲面31、33の間に形成されるフロントパネル7の前面を後方にやや傾いた大きな曲面35で形成することにより、壁面に設置した状態において、室内ユニット1を壁面になじんだ

コンパクトな形態に見せることができる。なお、本実施例では、フロントパネルのトップ面を構成する前記大きな曲面35を、図1に示す第1の状態において、開口部15の周囲に形成されるロ字状曲面部41と、断面形状が前記大きな曲面35と一致する複数の吸込ルーバー17とで構成している。

【0018】図2に戻り、更に、上面を曲面31で形成したことにより、第2の吸込部23を設置状態で目立ちにくくするとともに前方上方から室内空気を効率良く吸い込ませることができる。一方、下面を曲面33で形成したことにより、設置環境に馴染みやすい「面」を生かして吹出部9に傾斜を与えることができる。また、室内ユニット1は、フロントパネル7を一様な厚みのある扁平な形状とし、化粧カバー5との分割部に溝部37を形成することにより、フロントパネル7と化粧カバー5との勘合を良好にするとともに、連続した丸みのある大きな曲面31、33にアクセントラインを形成し、奥行感を軽減して、コンパクト感を一層向上させている。図面中、39は溝部37に隣接した化粧カバー5の両側下方に形成されるフロントパネル7の取外し用の手掛け凹部である。

【0019】図3で示す平面図において、化粧カバー5の上面に形成される第2の吸込部23と、バックキャビネット3の上面に形成される第3の吸込部25は主体となる複数の横桟43と補強用の縦桟45を疎らに備えたグリル形状とし、周囲に幅の広い筐体面を残すことで、大きな開口率を得ながら目立ちにくい形態としている。また、第2の吸込部23の前方両端部には、フロントパネル7を着脱可能とする着脱レバー43を設けている。

【0020】図4で示す底面図において、化粧カバー5の下面に形成される吹出部9は、フロントパネル7との分割部に隣接して配置される。2枚の風向板11a、11bは大きな曲面33とほぼ同一の曲面を備えた帯状の形態を備え、閉鎖状態で吹出部9の開口部をほぼ隠蔽して、室内ユニット1の底面に連続した大きな曲面33を形成する。そして、風向板11a、11bは両端部に設けた図示しない回転軸を支点にして、図示しない駆動モータを介して、運転時に吹出部9を冷暖房に対応して開閉し、運転停止時には、吹出部9の開口部を閉鎖するように制御される。

【0021】このように、本実施例に係る室内ユニット1の外観は、上面と底面が大きな曲面を介して前方に向けて絞り込まれ、正面4隅が大きな丸み形状で形成されるラウンドを基調とした上下左右ほぼ対称なコンパクトな形態とし、更に、正面に配置される吹出部9、第1、第2、第3の吸込部13、23、25、表示部27、受光部29を、中央を基準に左右対称に配置している。

【0022】そして、本実施例に係る室内ユニット1によれば、停止時では設置状態で見える吹出部9と第1の吸込部13を風向板11a、11bと吸込ルーバー17

で隠蔽して室内インテリアに調和させ、運転時には風向板11a、11bを冷暖房に対応して開放するとともに、吸込ルーバー17を開いて第1の吸込部13及び第2、第3の吸込部23、25から室内空気を吸い込み内部の熱交換器47で冷風または温風にして前記吹出部9から吹き出すことができる。更に、この室内ユニット1によれば、フィルタ交換や内部メンテナンスの際に、フロントパネル7を上部を支点にして下部を開放して前記作業をやりやすくするとともに、吸込ルーバー17を備えたフロントパネル7をルーバー駆動機構部200を化粧カバー5側に残したまま単独で取り外して洗浄、清掃することができる。

【0023】次に、図5～図8を参照して、室内ユニット1の内部機構とルーバー駆動機構部200を説明する。

【0024】図5において、バックキャビネット3の内側には貫流ファン45と熱交換器47とドレン皿49a、49b、風向板11a、11b等の基本的な内部構造体が取付けられる。そして、バックキャビネット3の内側に取付けられた貫流ファン45等の基本的な内部構造体は、化粧カバー5を取付けることにより室内ユニット1内に含まれる。化粧カバー5は、上部両側に取付リブを形成し、該取付リブを第3の吸込部25の前部に引っ掻けて、下部をネジ等を介してバックキャビネット3に取付ける。

【0025】化粧カバー5には、吸込ルーバー17を駆動させる駆動機構部200と、化粧カバー5の両側内壁に形成した図示しない案内レールを介して着脱可能に取付けられるフィルタ51と、前記表示部27及び受光部29とが取付けられる。前記ルーバー駆動機構部200は、駆動モータ201と、該駆動モータ201に取付けられる歯車203と、該歯車203と噛み合う板歯車205を備え、吸込ルーバー17の両側に上下に移動可能に設けられるラック207と、連結棒209等から構成される。前記歯車203とラック207は吸込ルーバー17の両側に設けられ、駆動モータ201は一方の歯車203と噛み合うように設けられる。そして、駆動モータ201の回転トルクは、一对の歯車203と噛み合う歯車211を両端部に設けた連結棒209で両側に設けた前記ラック207に伝達される。

【0026】また、フロントパネル7は、内側上部に設けたヒンジ部250を介して、フロントパネル7の下部を開閉可能かつ着脱可能に取付けられる。ここで、フロントパネル7の下部内側には図示しない突起部を設け、該突起部と対応する化粧カバー5の所定の位置に前記突起部と係合する凹部を設けることで、フロントパネル7の取付時に該フロントパネル7が簡単に開いたり運転時に振動しないようにしている。更に、フロントパネル7には、複数の吸込ルーバー17が、該吸込ルーバー17の長手方向の両側に設けられる運動板301を介し

て連動動作するように取付けられている。連動板301には、突起部302が設けられ、該突起部302が、前記ラック207に形成される四状の勘合部213に勘合することで、着脱自在な連結部300を構成し、ラック207のトルクを連動板301に伝達して吸込ルーバー17を開閉動作させる。

【0027】次に、図6を参照して、ヒンジ部250の構造を詳細に説明する。図6において、ヒンジ部250はフロントパネル7の上部両側に各1個設けている。そして、該ヒンジ部250は、フロントパネル7の両側上部に設けられる側面形状が円弧状(図5参照)で後方に張り出して形成される支持リブ251と、該支持リブ251の先端外側に設けられる凸状の回転軸253と、該回転軸253を支持して回転軸253方向(矢印P3、P4方向)に摺動可能に化粧カバー5に取付けられる軸受部255と、該軸受部255を化粧カバー5に摺動可能に保持する軸受保持部257と、軸受部255内に設けられ、軸受部255を矢印P3方向に常に押し出して回転軸253を保持するように取付けられるコイルバネ259と、前記軸受部255に設けられ、軸受部255とともに摺動可能に化粧カバー5の上面のレバー穴261に露出して設けられる着脱レバー43とから構成される。

【0028】この実施例に係るヒンジ部250によれば、回転軸253は、コイルバネ259の応力により矢印P3方向に押し出される軸受部255を介して化粧カバー5の前面に保持される。また、支持リブ251の先端に設けられる回転軸253は軸受部255に回転可能に支持され、フィルタ51の交換時等にはフロントパネル7を開閉することができる。更に、回転軸253と軸受部255の勘合は、指等で着脱レバー43を矢印P4方向に押し出すことで外すことができるので、フロントパネル7を簡単に化粧カバー5から取り外すことができる。

【0029】次に、図7、図8を参照して、ルーバー駆動機構について詳細に説明する。先ず、ルーバー駆動機構部200の横断面を示す図7において、歯車203が取付けられる駆動モータ201は化粧カバー5の内側の補強リブ214の片側にネジ等を介して取付けられる。また、他の片側に取付けられる歯車203は、駆動モータ201の代わりに同歯車203を回転自在に保持する図示しない軸受により前記補強リブ214に取付けられている。また、連結棒209は、前記歯車203に隣接して、補強リブ214に形成される取付リブ215に取付けられる。そして、連結棒209の両端に設けられる歯車211と前記歯車203が噛み合うようとする。このような構造により、駆動モータ201の回転トルクは、直接あるいは連結棒209を介して間接的に両側に設けた歯車203に均等に伝達される。

【0030】なお、この実施例では、歯車203の間に

熱交換器47が配置されているために、連結棒209を介して他方の歯車203に回転トルクを伝達したが、例えば、ルーバー駆動機構部200を熱交換器47の上方に位置させる等して、駆動モータ201の回転軸を延長して2個の歯車203を取付けてもよい。また、駆動モータの回転トルクが不足する場合は複数の歯車を組み合わせてもよい。

【0031】前記歯車203と噛み合う板歯車205を備えたラック207は、両側に形成される摺動溝217を、前記補強リブ214に形成されるラック支持部219で支持することで、上下方向(図面上前後方向)移動可能に支持される。この構造により、駆動モータ201の回転トルクはラック207により上下摺動動作に変換される。

【0032】一方、前記ラック207の凹状の勘合部213に勘合する突起部302を備えた連動板301は、両側に形成される摺動溝303を、フロントパネル7の内側に設けられる連結板支持部305で支持することで、上下方向(図面上前後方向)移動可能に支持される。また、前記開口部15の軸受21に回転軸19を介して回転可能に支持される吸込ルーバー17は、吸込ルーバー17の両端部下端に内側に張り出して形成される連動軸307を介して前記連動板301に連結されている。この構造を図8を参照してより詳細に説明する。

【0033】図8において、連動軸307は、連動板301に形成される摺動孔309に前後方向(矢印)に摺動可能に取付けられる。この摺動孔309は、連結板摺動方向Y(吸込ルーバーの垂直位置と略一致)と直角な水平線Xより摺動孔309の摺動軸線Q1の後方を下方に角度 Θ_1 傾斜させて形成している。また、連動軸307は、回転軸19より後方(図面上右側)にX1張り出して設けられることにより、連結板摺動方向Yとほぼ平行なルーバー閉鎖位置面Y2と、連動軸307と回転軸19を結ぶ軸線Q2が連結板摺動方向Yと角度 Θ_2 となるようにしている。そして、前記軸線Q2と摺動軸線Q1との角度 Θ が90°以上となるように設定している。

【0034】この構造により、連動板301を連結板摺動方向Y(上下方向)に移動させることにより、連動軸307が摺動孔309を円滑に移動して、結果として、連動軸307を回転軸19を支点とする点線で示す軌道Q3上を移動させることができるので、吸込ルーバー17を小さなトルクで開閉することができる。なお、この実施例では、角度 Θ_1 、 Θ_2 を設定して角度 Θ を90°以上に設定しているが、結果として角度 Θ を90°以上にすればよく、角度 Θ_1 、 Θ_2 の何れか一方を0°に設定してもよい。更に、この実施例では摺動孔309の摺動面311を傾斜する直線としているが、この摺動面311を、側面からみて下方に凸の円弧面を備えた摺動孔309としても同様な効果を得ることができる。また、この実施例では、吸込ルーバー17を45°程度回転回

転させるように、連動板301の移動距離と摺動孔309の大きさを決定している。

【0035】次に、図5および図8を参照して、本実施例に係る室内ユニット1の動作を説明する。

【0036】先ず、室内ユニット1は、内部に図示しない電装品ボックスに制御基板を備え、該制御基板に設けられるマイコンがファンモータ、ルーバー駆動機構部200、風向板11a、11b、各種のセンサー等の動作をリモコンからの操作信号を受光部29で受け、室内ユニット1を統括して制御する。

【0037】室内ユニット1は、運転停止状態で、図1に示すように、吸込ルーバー17及び風向板11a、11bが閉鎖された第1の状態となっている。この状態で、リモコンから運転操作の信号がなされると、図示しないマイコンは、リモコンからの操作信号または自動運転が設定されいれば各種センサからの情報に基づいて冷暖、または暖房等の運転モードを決定し、該決定に基づいて吸込ルーバー17及び風向板11a、11bを動作させて、吸込ルーバー17及び風向板11a、11bが開放した第2の状態を取るように動作させる。

【0038】つまり、マイコンは、図示しない駆動モータを動作させ風向板11a、11bを運転モードに対応した吹き出し角度まで開放する。また、マイコンは、前記風向板11a、11bの動作に連動して吸込ルーバー17を開放する駆動モータ201を動作させる。駆動モータ201の回転トルクは、歯車211を備えた連結棒209を介して両側に配置した歯車203に伝達され、一対の歯車203を同一回転させ、板歯車205を介してラック207をラック支持部219に沿って上下方向の動作させる。そして、このラック207の動きは、勘合部213と突起部302との勘合により、連動板301を上下方向に動作させ、複数の吸込ルーバー17の連動軸307を摺動孔309に沿って移動させて、吸込ルーバー17を回転軸19を支点にして開放して第2の状態にする。

【0039】次に、マイコンは貫流ファン45を回転させ、第1、第2、第3の吸込部13、23、25から室内空気を吸い込んで熱交換器47で温風または冷風あるいは熱交換しないで風向板11a、11bに沿って吹出部9から吹き出せるように制御する。一方、運転を停止する際は、貫流ファンを停止した後に、駆動モータ203及び風向板11a、11bの駆動モータを逆回転させることで第2の状態から第1の状態に戻すように制御する。

【0040】このように、本実施例に係る室内ユニット1によれば、運転停止状態である第1の状態においては、設置状態で内部が露出する第1の吸込部13及び吹出部9を吸込ルーバー17及び風向板11a、11bを介して室内ユニット1の筐体面とほぼ同一面をなす平面で隠蔽することができるから、室内ユニット1を平面主

体の壁面に馴染ませて室内のインテリアに調和させ、更に同第1の吸込部13及び吹出部9からの塵埃等の進入を軽減することができる。

【0041】一方、運転状態の第2の状態では、常に開口している第2、第3の吸込部23、25に加えて、第1の吸込部13の吸込ルーバー17を開放して開口率を大きくして広い面積から室内空気を吸込むことができるので、送風抵抗を小さくして、冷暖房能力や騒音を軽減することができる。特に、吸込ルーバー17は、上下に複数に分割しているので、吸込ルーバー17を開放した際の前方への吸込ルーバー17の突出量を小さくすることができます。更に、吸込ルーバー17は、吸込ルーバー17の上部を開放して斜めに開放されるので、設置状態で、下方より見上げられても、第1の吸込部13の内部を見えにくくすることができるとともに、吹出された空気がすぐに第1の吸込部13に吸い込まれるショウトサーキットを軽減することができる。加えて、この実施例では、回転軸19を吸込ルーバー17の側端部の中央よりに設けて、開放した際に吸込ルーバー17の下部が内側に入り込む構造としているので、開放した際の前方への吸込ルーバー17の突出量を更に小さくして、壁面設置時の吸込ルーバー17等が前方に大きく張り出すことによる圧迫感を軽減することができる。

【0042】なお、この実施例では、風向板11a、11bと吸込ルーバー17を同時に開放するようしているが、風向板11a、11bを動作させた後に吸込ルーバー17を動作させて2つの駆動モータの同時動作をなくして最大電力を軽減してもよい。特に、暖房時に熱交換器47が暖まるまで吸込ルーバー17を閉鎖することで、前記暖まる時間を短縮するようにしてもよい。また、回効率が少なくてよい低能力運転時や送風運転を第1の状態で行うようにしてもよい。

【0043】次に、図5、図8を参照して、フィルタ51とフロントパネル7の着脱について説明する。

【0044】この実施例のフロントパネル7は、上部をヒンジ部250を介して取付けられ、下部は内側に図示しない突起部を設け、該突起部と対応する化粧カバー5の所定の位置に前記突起部と係合する凹部を設けることで、フロントパネル7の取付時に該フロントパネル7が簡単に開いたり運転時に振動しないようにしている。

【0045】したがって、フィルタ51を着脱する際は、第1の状態で、手掛け凹部39を介して、前記突起部と凹部の係合を外すことで、フロントパネル7を前記ヒンジ部250の回転軸253を支点にしてフロントパネル7の下部を大きく開放することができるので、この大きく開放した部分からフィルタ51を簡単に引き出し、また、フィルタ51の清掃した後に再度フィルタ51を案内レールに沿って簡単に装着することができる。しかも、この着脱動作では、上面の第3、第2の吸込部25、23及び正面に配置した第1の吸込部13の後方

に位置するフィルター51を底面に設けた吹出部9から大きく屈曲させて引き出させる必要がないから、フィルタ51への無用な応力を強いることがなく、更に屈曲時の塵埃の飛散等を軽減して、広い空間から楽に着脱することができる。また、フロントパネル7の開放により、化粧カバー5の前面を露出することができるから、この露出した部分、例えば、フィルター51の図示しない案内レールや、フィルター51で取り除かなかった熱交換器47等に付着した塵埃を掃除機等で清掃することができる。

【0046】更に、この実施例では、吸込ルーバー17の動作機構を、化粧カバー5に取付けられるルーバー駆動機構部200と、フロントパネル7に取付けられる連動部301とに分離して設け、該ルーバー駆動機構部200と連動部301とを、連動板301に形成されるる突起部302と、ラック207の凹状の勘合部213との勘合で動作を伝達する分離可能な連結部300で連結しているので、簡単な構造で、しかもフロントパネル7の開閉動作に基づいて連結部300を着脱することができる。加えて、複数の吸込ルーバー17は連動しているので、フロントパネル7の装着にあたっては、少なくとも1枚の吸込ルーバー17を開めることにより、他の吸込ルーバー17を開めることができ、しかも、連結部300の位置合わせを容易に行うことができる。

【0047】なお、ヒンジ部250に開放角度ロック機構を設けて、フロントパネル7を開放状態を維持するようにしてもよい。この開放角度ロック機構としては、例えば、図6に示す回転軸253の近傍の支持リブ251と軸受部255の摺動面260a、260bに図示しない突起部と凹部を設けて、所定の角度で勘合してロックするようにすればよい。

【0048】次に、この実施例では、第2の吸込部23の両側前部に設けた着脱レバー43を両側に押し出すことで、フロントパネル7を、図5の点線で示したように、化粧カバー5から取り外して、流し台等で丸洗いすることができる。この際、ルーバー駆動機構部200は化粧カバー5に残されてフロントパネル7には電送品が設けられていないために、配線の取外しや洗浄時の電送品への水の浸入を気にせず清掃することができる。しかも、着脱に際しては、複数の吸込ルーバー17が連動部301により連結されているので、個々の吸込ルーバー17がばらついて塵埃を飛散することを軽減できるとともに、前記したように装着時の連結部300の位置合わせを容易に行うことができる。

【0049】〔他の実施例〕次に、図9、図10を参照して、本発明に係る空気調和機の他の実施例を説明する。図9は他の実施例に係る吸込ルーバー17の部分断面図、図10は他の実施例に係る空気調和機の縦断面図である。

【0050】先ず、図9で示す吸込ルーバー400は、

吸込ルーバー400の下端部を支点にして開閉可能に設けることで、設置状態で、第1の吸込部13の内部をより見えにくくしたものである。図において、吸込ルーバー400は、両端部に設けた回転軸19を下端部に設け、連動軸307を回転軸19の後方にX2だけ張り出して設けている。連動軸307は、連動板301aに形成される摺動孔309aに前後方向(矢印)に摺動可能に取付けられる。この摺動孔309は、連結板摺動方向Y(吸込ルーバーの垂直位置と略一致)と直角な水平線Xより摺動孔309の摺動軸線Q1aの後方を上方に角度θ1a傾斜させて形成している。そして、連結板摺動方向Yと摺動軸線Q1aとの角度θaが90°以下となるように設定している。

【0051】この構造により、連動板301を連結板摺動方向Y(上下方向)に移動させることにより、連動軸307が摺動孔309を円滑に移動して、結果として、連動軸307を回転軸19を支点とする点線で示す軌道Q3a上を移動させることができるので、吸込ルーバー17を小さなトルクで開閉することができる。

【0052】このように、この実施例では、連動板301と連動軸307との相対的な関係を、連動軸307が連結板摺動方向Yと反対方向に移動可能のように摺動軸線Q1aを設定することにより、連動軸307が摺動面311を動きやすくやすくすることができるので、始動時のルーバー駆動機構部200のトルクを小さくすることができる。

【0053】図10で示す室内ユニット1は、ルーバー駆動機構部の他の実施例を示したものである。この実施例に係るルーバー駆動機構部500は、化粧カバー5に取付けられる駆動モータ501と、駆動モータ501の回転軸に直結する歯車502と、化粧カバー5に前後方向に図示しない案内レールで移動可能に取付けられ、前記歯車502と噛み合う板歯車503を備えたラック504とから構成される。また、複数の吸込ルーバー17を連動させる連動板301の下端部には、連動板301を引っ張って吸込ルーバー17を開じようとするバネ504を設けている。

【0054】さて、この実施例によれば、第1の状態では、ラック504の先端が本体内に収納され、バネ504により吸込ルーバー17は閉じられている。次に、駆動モータ501が動作すると、ラック504の先端が前方に押し出され、一枚の吸込ルーバー17の内側に当接して吸込ルーバー17を回転軸19を支点にして開放することにより、他の吸込ルーバー17も連動板301を介して開放される。また、吸込ルーバー17を閉鎖する場合は、ラック504を引き込むことにより、バネ504により吸込ルーバー17を閉鎖することができる。なお、ラック504は吸込ルーバー17の中央に設けてもよく、また、前記連結棒209や駆動モータ501の回転軸に直結した一対の歯車502等を設けて、ラック504

04を吸込ルーバー17の両側に設けててもよい。

【0055】なお、前記の実施例では、化粧カバー5とバックキャビネット3を分離した構造としているが、同部材を一体構造としたバックカバーで構成してもよい。

【0056】また、前記実施例では、筐体の上面に第2、第3の吸込部23、25を設けた実施例で説明したが、同第2、第3の吸込部23、25を設けなくても同様な効果がある。また、前記第2、第3の吸込部23、25を設ける場合、同吸込部23、25を備えた天板を同様な構造で化粧カバー5と着脱可能に設け、同吸込部23、25に前記実施例と同様な構造を備えた開閉可能な吸込ルーバーを設けることで、塵埃の内部への浸入を軽減して、更に取外して清掃することができる。また、前記天板をフロントパネル7と一体構造とするようにして、同一体化したフロントパネル7を開閉可能かつ着脱可能することで前記した効果を一層高めることができる。

【0057】

【発明の効果】第1の発明によれば、フロントパネル装着した場合は外観意匠の意匠性を高めつつ、開閉可能な吸込ルーバーを簡単な構造で吸込ルーバーの駆動機構部と分離し、かつ該駆動機構部を筐体側に残してフロントパネルを着脱することができるので、フロントパネルや筐体前部の清掃を容易にすることができます。

【0058】また、第2の発明によれば、フロントパネルを装着した場合は外観意匠の意匠性を高めつつ、開閉可能な吸込ルーバーを簡単な構造で吸込ルーバーの駆動機構部と分離し、かつ該駆動機構部を筐体側に残してフロントパネルを着脱または開閉可能にすることができます*

*ので、フィルタの着脱を容易にして清掃性を向上させることができる。

【図面の簡単な説明】

【図1】本発明に係る空気調和機の一実施例を示す外観斜視図。

【図2】本発明に係る空気調和機の一実施例を示す側面図。

【図3】本発明に係る空気調和機の一実施例を示す平面図。

10 【図4】本発明に係る空気調和機の一実施例を示す底面図。

【図5】本発明に係る空気調和機の一実施例を示す縦断面図。

【図6】本発明に係る空気調和機の一実施例を示す要部部分断面図。

【図7】本発明に係る空気調和機の一実施例を示す要部部分横断面図。

【図8】本発明に係る空気調和機の一実施例を示す要部部分縦断面図。

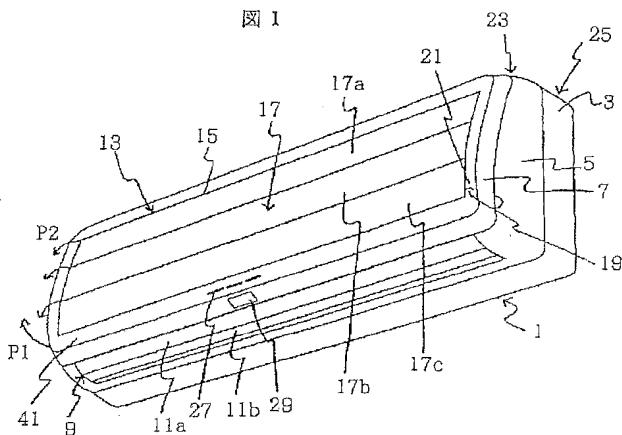
20 【図9】本発明に係る空気調和機の他の実施例を示す縦断面図。

【図10】本発明に係る空気調和機の他の実施例を示す要部部分縦断面図。

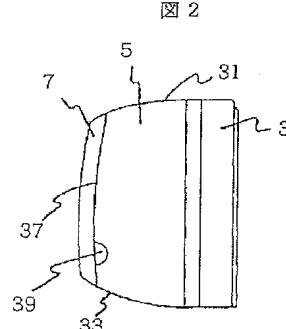
【符号の説明】

1…室内ユニット、3…バックキャビネット、5…化粧カバー…、7…フロントパネル、9…吹出部、13…第1の吸込部、15…開口部、17…吸込ルーバー、19…回転軸、21…軸受、200…ルーバー駆動機構部、25…ヒンジ部、300…連結部、301…連動部。

【図1】

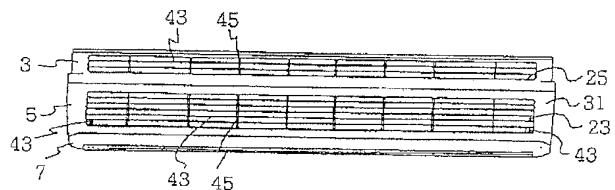


【図2】



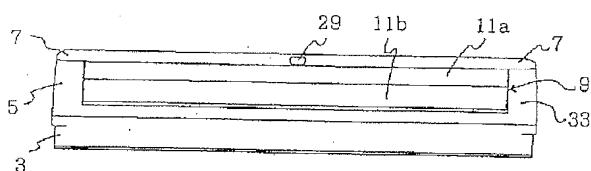
【図3】

図3



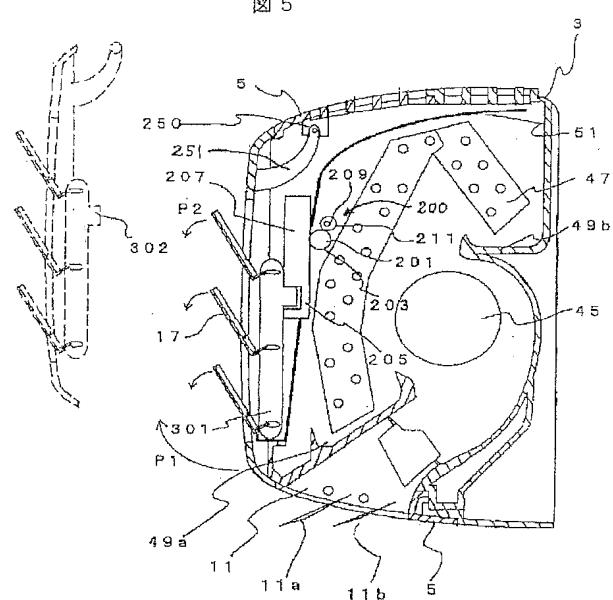
【図4】

図4



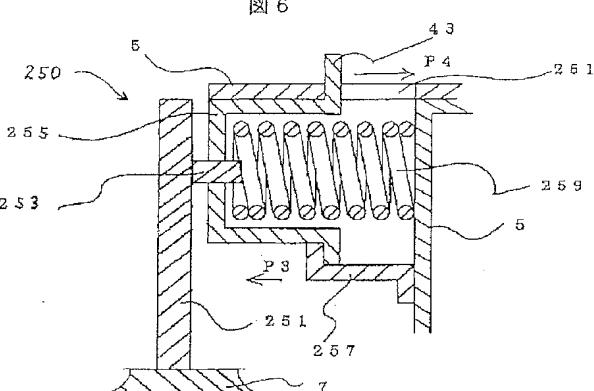
【図5】

図5



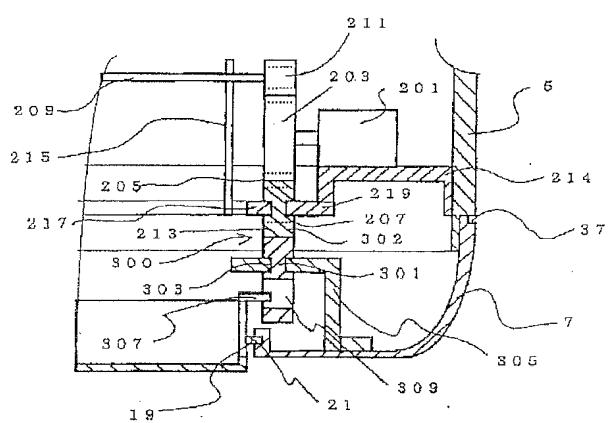
【図6】

図6



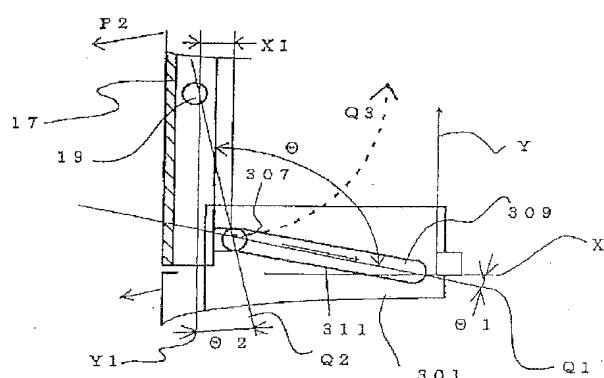
【図7】

図7



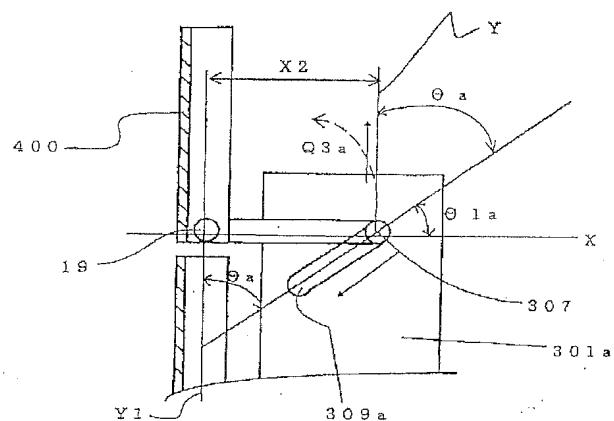
【図8】

図8



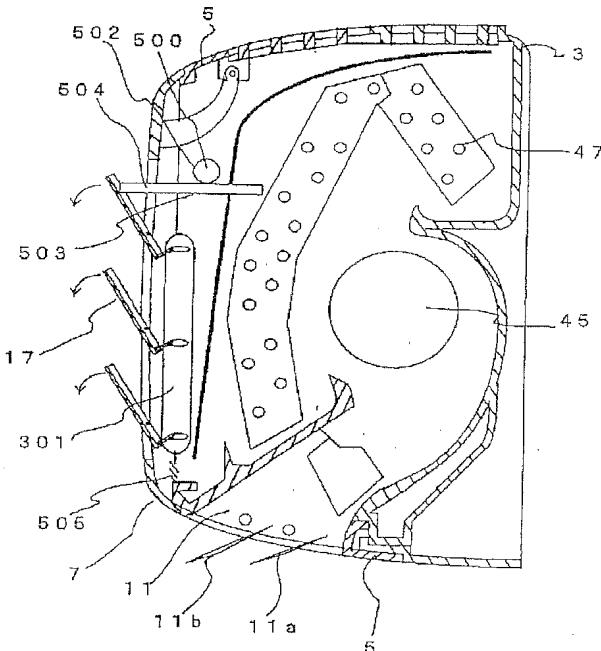
【図9】

図9



【図10】

図10



フロントページの続き

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